

Techniphos 615

Electrolytic Nickel/Phosphorus Plating

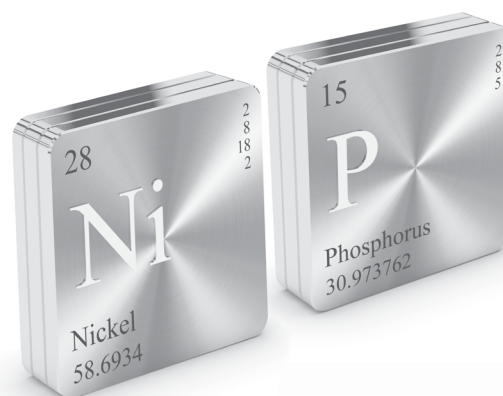


High-Speed, High Phosphorus (> 10% P) Electrolytic Nickel Alloy Process

Techniphos 615 is an electrolytic nickel/phosphorus (NiP) plating process that produces >10 % phosphorus over a wide current density range.

Unlike typical NiP processes that exhibit low phos content at high current densities, Techniphos 615 represents a truly unique formulation that outperforms anything currently available.

Techniphos 615 is recommended for all applications requiring an electrolytic NiP alloy with greater than 10% P. One of the key advantages of Techniphos 615 is its suitability for the growing 5G applications market, as it meets the requirement for a lower degree of magnetism.

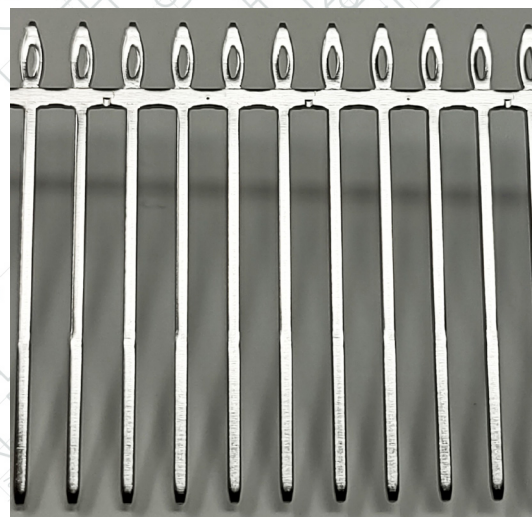


Benefits

- Improves corrosion resistance vs pure nickel barrier layers
- Higher throughput thanks to wider current density range
- Superior performance in high-speed applications
- Suitable for single or duplex applications
- Potential reduction in precious metal thickness
- Can be used in standard nickel cells

Features

- Consistently deposits greater than 10% phosphorus
- Capable of high speed deposition with high phosphorus content
- Deposits are highly corrosion-resistant
- Non-magnetic deposit - suitable for high frequency/5G applications
- Can be used in reel-to-reel, barrel, and rack plating applications
- Completely boron-free, no crystallization
- Easily analyzable components



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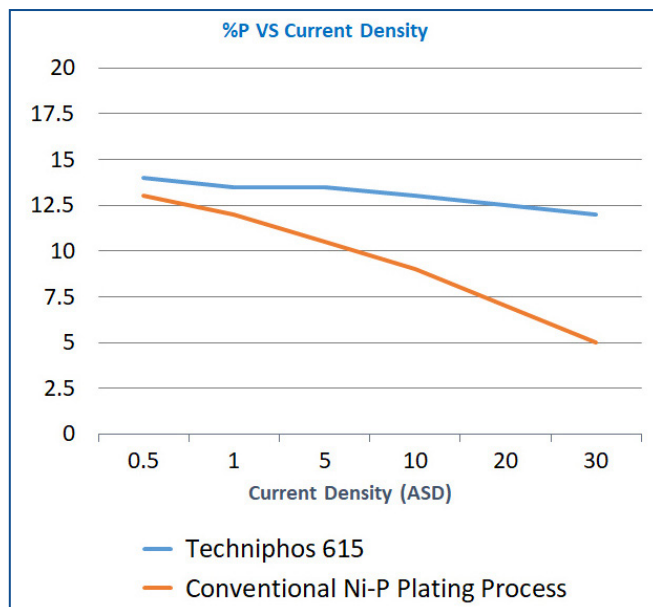
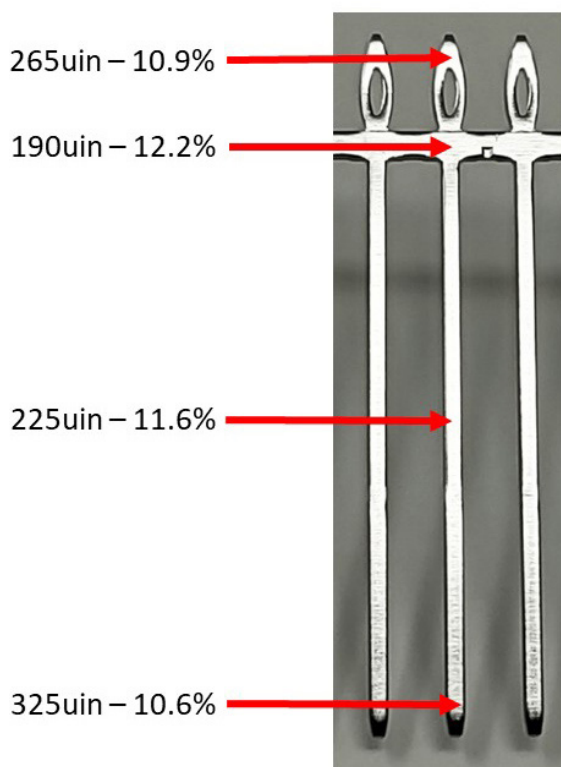
Operating Parameters

Note: Optimum values below are dependent on application.

Parameters	Range
Nickel Metal	25 – 110 g/l
Nickel Chloride	8 – 18.0 g/l
Techniphos 615 Phosphorus Concentrate	110 – 140 ml/l
Techniphos 615 Additive	75 – 125 ml/l
Techniphos 615 Secondary	15 – 25 ml/l
pH	1.7 – 2.2
Cathode Current Density	0.3 – 40 ASD
Operating Temperature	58 – 62 °C
Deposition Rate	Up to or exceeds 2 $\mu\text{m}/\text{min}$ (80 $\mu\text{in}/\text{min}$) depending on current density.

Connector Substrate Plating at 25 ASD

Techniphos 615 demonstrates excellent high phosphorus distribution, all measured locations provide >10% P.



Techniphos 615 produces high phos content (>10%P) at higher current densities compared to conventional NiP.

Magnetic Permeability

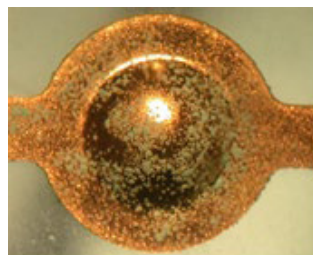
Magnetic permeability (μ) is the degree of magnetization of material in response to a magnetic field.

Results for connector substrates plated with 2.5 μm of nickel or Techniphos 615 are shown below:

Sample	$\mu \times 10^3$
Nickel	1.26
Techniphos 615	<0.1

NAV Testing - Nitric Acid Vapor Test Results

30 min Flash Gold over Ni



Sulfamate Ni (2 μm)
+ Conventional
Au-Ni (3 μin)

FAIL



Goldeneye Ni (1.5 μm)
+ Techniphos 615 (0.5 μm)
+ Au-Ni (3 μin)

PASS



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